# Development of Song-Assisted SiMo Application with TGT Model on Animal Morphology Adaptation Material at Elementary School

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**Abstract:** The development of science has encouraged the birth of various innovative technologies that can facilitate human work in daily life. This symbolizes technological progress in various fields, including education, such as the rampant use of technology-based learning media in a more effective learning process. This study assesses the feasibility, practicality, and effectiveness of using Song-Assisted SiMo Application products with TGT Models on Animal Morphology Adaptation Materials in grade VI of elementary school. Indicators in this study are that it is hoped that students can appropriately determine and analyze the form of morphological adaptation in animals. The research method used is *Research and Development* (R&D) with the Borg and Gall Model, which includes eight out of ten stages: (1) potential and problems; (2) data collection; (3) product design; (4) design validation; (5) design revision; (6) product trials; (7) product revision; and (8) trial use. The results of the study show that the SiMo Application media is a product that is worth using, with a percentage value of 91.25% from media experts and 93.75% from material experts, and supported by the results of the questionnaire response of 88% of teachers and 91% of students. In the results of the N-gain test, a 64% percentage was obtained, showing that the SiMo Application product effectively improves student learning outcomes.

**Keywords:** Animal Morphological Adaptations; SiMo Application; Song; TGT (Teams Games Tournament) Model.

## Introduction

Along with the development of science, the birth of various innovative technologies that can facilitate human work has become a symbol of technological progress in various fields, including education [1]. Rapid technological advancement has caused significant changes in the field of education in Indonesia, which has opened up new opportunities and serious challenges [2]. As is the case, according to [3], education today is experiencing very difficult and serious challenges. The advancement of science and technology emphasizes the importance of teachers mastering the learning material and understanding the essence of the learning process, starting from the cognitive, affective, and psychomotor components. In several examples of the development of science and technology in education, improving the quality of education has become an increasingly important topic.

In improving the quality of education, the educational curriculum needs to be adjusted to the development of the times so that students can be better prepared to face the rapid changes in the environment and science and technology. The 2013 curriculum emphasizes improving reasoning rather than memorization [3]. According to [4], The current learning paradigm prioritizes focusing on students' activeness, and teachers are facilitators. The 2013 curriculum emphasizes developing students' critical thinking skills, which are important components in life, work, and other activities aligned with national education goals. In addition, this aligns with 21st-century competencies, which include creative thinking skills, critical thinking and problem-solving,

communication, and collaboration [5]. So, to cultivate 4C skills in students, teachers need to be sensitive and responsive to students' learning needs[6].

Natural Sciences is one of the disciplines with unique characteristics that have undergone significant development, namely focusing on factual natural events, both in the form of facts and events with a cause-and-effect relationship [7]. According to [8], science education is intended to help students understand themselves and their environment and build the ability to apply what they learn in daily life. This requires the ability of teachers to design and implement learning based on an understanding of science principles that are relevant in daily life. In addition, the science learning process also requires the help of these concrete objects to obtain a good understanding of the concept of natural conditions students, which concrete objects are not always easy to get, so teachers' creativity is needed in managing effective and efficient learning media following learning objectives [6].

Based on observations and interviews with grade VI teachers of SD Negeri Sidorejo 02, Gringsing District, Batang Regency, there are several problems in the science learning process of animal morphological adaptation materials, including using conventional media and learning models. The limited use of learning media without innovation, the learning model using the lecture method, and the lack of library reading books to support the learning process outside the classroom cause students to become passive, lack interest, and quickly bored in the learning process. The learning problems at SD Negeri Sidorejo 02 Gringsing caused the results of the assessment on the content of science lessons to show that the average score of

grade VI students of SD Negeri Sidorejo 02 with a total of 22 students was still below the KKM, with details: as many as seven students got a score above the KKM, and 15 students got a score below the KKM. This shows a discrepancy between the goals of education in Indonesia as stated in the preamble to the 1945 Constitution, which is to educate the nation's life.

In line with [9, in learning, using a lecture-based learning model and not using media, the material delivery becomes monotonous, and students get bored quickly. In the learning process, the learning components are actively interconnected and affect each other, and delivering material must be done using the correct method and with the support of appropriate learning media [10]. The learning model is a conceptual framework for designing and implementing learning, organizing learning experiences to achieve goals/competencies, and as a guideline in the learning process that contains systematic learning steps (syntax). At the same time, learning media is everything that can be used as a means of channelling messages and material information so that the learning process occurs [11].

Based on the problems found in grade VI of SD Negeri Sidorejo 02 Gringsing, the researcher wants to apply the development of digital-based learning media as a solution to overcome existing issues, as well as to measure the level of feasibility, practicality, and effectiveness of the use of the product. The media produced by the researcher is called the Song-Assisted SiMo Application with the TGT Model on Class VI Animal Morphology Adaptation Material. The product is designed using the web code, with content designed with the help of the Canva application, and some of its features are integrated with various websites such as YouTube, Google Drive, Flipbook PDF, Quizwhizzer, Bamboozle, and LiveWorksheet. In the media, the Song-Assisted SiMo Application with the TGT Model consists of many features to support learning success. As for the design of digital learning media, educators must adjust to the needs of students at each level [12].

The SiMo application has the theme 'Sightseeing to the Zoo' with the help of Animal Morphology Adaptation Songs and by using the TGT *(Teams Games Tournament)* learning model, in which in this model students will be divided into several small groups of 5-6 students heterogeneously both based on their ability levels, backgrounds, and different genders in each group in games and tournaments. Students can develop their thinking skills through direct learning experiences by finding facts and building concepts [13].

According to [14, the TGT-type cooperative learning model can help students form confidence in fellow group members, as well as in collaboration and competition. In addition, the TGT-type cooperative learning model increases students' interest in learning because, indirectly, students will try to get as many points as possible in the learning process [15]. According to Slavin (2020) [16], TGT-type cooperative learning consists of 5 stages: class presentation, group learning, games, tournaments, and team recognition.

In addition, in the era of advanced technology, teachers can create a comfortable and fun learning atmosphere can be done, one which is selecting themes that are in harmony with the learning material, such as the use of songs that are not only an entertaining medium but also a medium in the process of memorizing various terms or new information for students [17]. According to [18], Songs are a trustworthy source of language because they can be used anywhere and anytime at will, and songs with their simple language and joyful rhythm are suitable for students in elementary school. This is in line with research [19], which says that some people can listen to a song without being ordered to memorize it; they can memorize the lyrics and sing it anytime and anywhere. Songs can also improve memory and long-term memory [20].

This study introduces a new approach in the application of the TGT (*Teams Games Tournament*) type cooperative model in collaborative learning at the elementary level by focusing on the development of student's critical thinking and offering a unique contribution by designing and implementing special applications that support the implementation of TGT digitally. However, the TGT model has long been applied in education. However, the transition from paper media to digital applications at the elementary level is new and has not been widely explored. The app integrates more complex and technology-based game components to improve interaction between team members and overall learner engagement. Not only that, this study also proposes a more holistic evaluation methodology, not only evaluating academic results but also the impact on students' learning motivation and social skills. The results of this study are expected to make a significant contribution to the existing literature by showing that adapting a more dynamic and technology-based TGT model can increase the effectiveness of collaborative learning, especially in developing students' critical thinking skills. In addition, it is also expected to be the basis for further development in applying a more modern and effective TGT model in the basic education environment.

The independent variable studied was song-assisted SiMo Application development with the TGT (*Teams Games Tournament*) model. In contrast, the bound variable was the learning outcomes of students. Based on research conducted by [21], the use of digital technology in collaborative learning has been proven to increase the active involvement of students by providing a more interactive and responsive learning environment. Meanwhile, students' learning outcomes can be measured using a pretest and posttest regarding class VI animal morphology adaptation material. This study adapts the media and learning models used in previous research by adding a learning analytics component to monitor student development in real-time, which has not been widely discussed in the last literature. Thus, this study re-examines previous findings and makes new contributions by providing deeper insights into the dynamics of digital learning in the classroom.

Based on the background mentioned, the problem formulation in the research is obtained; (1) How feasible is the media of the Song-Assisted SiMo Application with the TGT Model? (2) How practical is the media of the Song-Assisted SiMo Application with the TGT Model? (3) How effective is the media of the Song-Assisted SiMo Application with the TGT Model? As for the formulation of the problem, the objectives of this study: (1) describe the feasibility level of the SiMo Berbinatun Song Application

with the TGT Model; (2) describe the level of media practicality of the Song-Assisted SiMo Application with the TGT Model; (3) describe the level of media effectiveness of the Song-Assisted SiMo Application with the TGT Model. This research is expected to be a source and guide for teachers in building and managing an effective learning process. Not only that, this research can also provide information that allows teachers to determine media and learning models that are following the conditions and needs of students. Thus, this research can help teachers improve the quality of learning and student learning outcomes.

## Research Methods

In this study, the research method is used in Research and Development (R&D), aiming to develop or create effective and efficient products and validate them through trials and revisions. The development model used is according to Borg and Gall with the following steps:
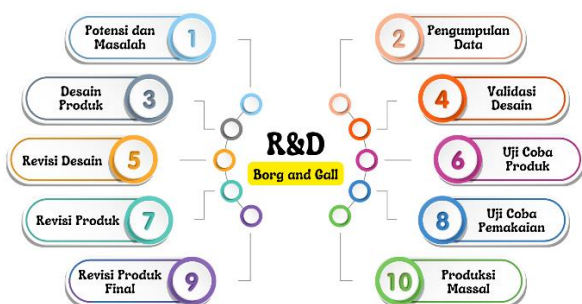


**Figure 1.** Steps of the R&D method according to Borg and Gall

In this SiMo Application media development research, the researcher only uses eight out of ten steps of the development model according to Borg and Gall which include: (1) potentials and problems, through observation activities; (2) data collection, through interviews, filling out needs questionnaires, and also student assessment results; (3) product design, which is to make product design adapted to the conditions and needs in learning; (4) design validation, product feasibility assessment to media and material experts; (5) design revision, product design improvement in accordance with input from media and material experts; (6) product trials, conducting small-scale research to get responses related to the products developed; (7) product revision, product improvements are carried out if there is something that is not in accordance with the product trial as seen from the results of the responses of teachers and students; and (8) use trials, namely by conducting large-scale research to test the level of effectiveness of product use.

This research was conducted at SD Negeri Yosorejo and SD Negeri Sidorejo 02, Gringsing District, Batang Regency. The subjects of this study were divided into two groups, namely small groups and large groups. Small groups were used in the initial trial to see the responses of students and teachers and to get an evaluation related to the feasibility and practicality of the product developed. Meanwhile, a large group was used in the use trial to determine the effectiveness of using SiMo Application media and improving students' learning

outcomes in learning science content of animal morphology adaptation material. The small group consisted of 15 students in grade VI of SD Negeri Yosorejo, while the large group consisted of 22 students in grade VI of SD Negeri Sidorejo 02 Gringsing.

In this study, data collection was carried out through test and non-test techniques. The test technique obtained data by testing students' pretest and posttest. As for the non-test technique through the results of interviews, direct observation, assessment, and filling out student questionnaires. After obtaining the results of data collection, then data analysis is carried out to develop quality products by meeting the criteria of feasibility, practicality, and effectiveness. The data analysis techniques in this study include qualitative descriptive analysis, quantitative descriptive analysis, and inferential statistics. A qualitative descriptive analysis was conducted to find the responses and suggestions from experts related to the media of the Song-Assisted SiMo Application with the TGT Model. Quantitative descriptive analysis was performed to analyze the scores of experts, students, and teachers related to the SiMo Application media. Meanwhile, inferential statistical analysis is used to test the product's effectiveness.

Data analysis to determine the level of feasibility of the SiMo Application product using a test questionnaire instrument on media and material experts. The results of the expert test questionnaire score are then calculated with a formula according to [22] as follows:

$$NP = \frac{R}{SM} \times 100\%$$

Information:
NP = Eligibility percentage value
R = Raw score obtained
SM = Maximum score in the questionnaire

The results of the percentage of eligibility data are then converted with the eligibility criteria for expert validation as follows.

**Table 1.** Expert Validation Eligibility Criteria

| Percentage | Criterion |
|---|---|
| 81% - 100% | Highly Worthy |
| 61% - 80% | Proper |
| 41% - 60% | Quite Decent |
| 21% - 40% | Less Worthy |
| 0% - 20% | Very Unworthy |

[22]

Furthermore, in the data analysis to determine the level of practicality of using the SiMo Application product in learning the science content of animal morphology adaptation material, the results of the response questionnaire of students and teachers were used, which were measured using the formula according to the [23] as follows:

$$V - au = \frac{Tse}{Tsh} \times 100\%$$

Information:
V - au = Audience validation value
Tse = Total empirical score obtained
SM = Total expected score

The results of the percentage of practicality data are then converted using the following product practicality criteria.

**Table 2.** Criteria for the Practicality of Student and Teacher Responses

| Percentage | Criterion |
|---|---|
| 81% - 100% | Excellent |
| 61% - 80% | Good |
| 41% - 60% | Pretty Good |
| 21% - 40% | Not Good |
| 0% - 20% | Very Not Good |

[23]

Researchers in processing data use analysis techniques such as the normality test, Wilcoxon test, and n-gain test with the help of *IBM SPSS Statistics 25*. The normability test determines whether the collected data is usually distributed, and the Wilcoxon test compares the average difference between two samples. In contrast, the N-gain test assesses the effectiveness of the learning process or intervention in improving student learning outcomes. Thus, data analysis techniques help researchers provide the necessary information to make recommendations based on analysis findings and decisions based on data.

Data analysis in the normality test and Wilcoxon using *SPSS* on the results of the pretest and posttest, then classified to obtain the basis for decision-making from the use of the developed product, the criteria are as follows:

**Table 3.** SPSS  Normality Test Criteria

| Result | Conclusion |
|---|---|
| If the significance value < 0.05 | Abnormal Distribution |
| If the significance value > 0.05 | Normally distributed |

[24]

**Table 4.** Wilcoxon SPSS Test Criteria

| Result | Conclusion |
|---|---|
| If the significance value < 0.05 | Hypothesis accepted |
| If the significance value > 0.05 | Hypothesis rejected |

[24]

Meanwhile, in the data analysis to determine the level of effectiveness of the use of SiMo Application products in learning science content animal morphological adaptation materials, the N-gain formula was used according to [25] as follows:

$$\text{N - gain} = \frac{\text{Skor Posttest} - \text{Skor Pretest}}{\text{Skor Maksimal} - \text{Skor Pretest}}$$

The results are then classified according to the N-gain value criteria as follows:

**Table 5.** N-gain Value Criteria

| Percentage | Criterion |
|---|---|
| $N - \text{gain} \geq 0.70$ | Tall |
| $0.30 < N - \text{gain} < 0.70$ | Keep |
| $N - \text{gain} \leq 0.30$ | Low |

[25]

## Results and Discussion

### Potential and Problems

Initial observations of grade VI students at SD Negeri Sidorejo 02 Gringsing showed that several factors caused the lack of interest in students in science learning, including the use of conventional and less innovative media and learning models, as well as the lack of understanding of teachers about student characteristics such as interests, cognitive development, learning styles, motivation, emotions, social, moral, and motor cause students to get bored quickly and lack interest in learning. Some of these factors cause a less-than-optimal learning atmosphere and must be adjusted in the learning approach. Teachers must recognize the character of each student and apply a more dynamic and exciting learning approach. So, it is hoped that the motivation and enthusiasm of students in learning can increase.

### Data Collection

Based on the results of interviews with grade VI teachers of SD Negeri Sidorejo 02, Gringsing District, the learning process used is still conventional, with a lecture method that does not involve students. In addition, the limitations and use of makeshift learning media without innovation or renewal can affect the acquisition of student learning outcomes. As a result, teachers also face challenges in managing classes and analyzing student learning outcomes.

Technology-based learning media, in the form of applications and websites accessed through gadgets, has never been done in the science learning process. However, in daily life, students are used to using gadgets. However, its use is not fully utilized in students' learning process. This is the basis for researchers to develop Song-Assisted SiMo Application Media with the TGT Model. The researcher uses an instrument in the form of a questionnaire of students and teachers to understand the needs needed to create application-based learning media tailored to students' conditions and needs.

### Product Design

The product produced by the researcher is in the form of Song-Assisted SiMo Application media with TGT Model on Animal Morphology Adaptation Materials for Class VI Elementary School. This learning media contains several features, such as learning materials and videos, and it is integrated with games and tournaments to test the understanding that has been obtained. This learning media is made using the modular web and then exported into an application to be installed on the device.

In the initial process of arranging the display on the SiMo Application media, the Canva application was used. In this process, the researcher made all content displays on the product, such as materials, images, videos, and application backgrounds according to the theme, namely an excursion to the zoo and a TGT (*Teams Games Tournament*) type cooperative learning model assisted by songs.

Then, from all the content that has been created, compiled and combined into the modular web, several features are integrated with the YouTube web to access learning videos, quiz whizzes and bamboozle to access games and tournaments, as well as live worksheets used to access e-evaluation in learning. After that, the process of converting the product into an application is carried out by exporting files on the coded web, and then installation is carried out on the gadget to run the product.

The display on the Song-Assisted SiMo Application with the TGT Model on the Morphology Adaptation Material for Class VI Elementary School Animals is as follows:
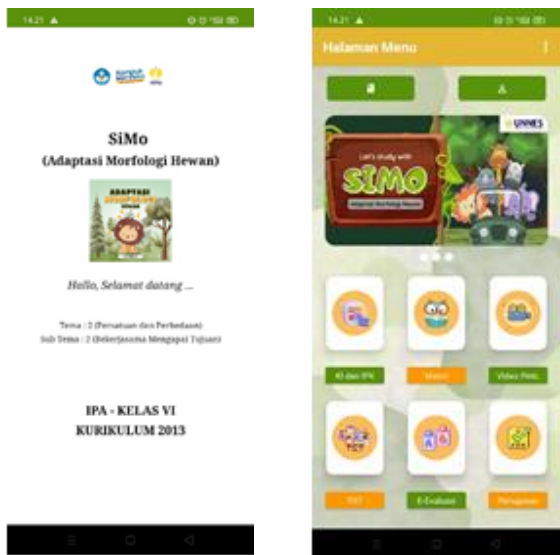


**Figure 2.** a. Initial View, b. Main Menu

The first page contains the logo and title of the interactive learning media SiMo Application (Morphological Adaptation) of Animals with the theme 'Excursion to the Zoo' on Theme 2: Unity and Difference, Sub Theme 2: Working Together to Achieve Goals, Science Learning Content for Class VI Elementary School Curriculum 2013. Then, the display on the home page will change automatically to the menu page a few moments after the SiMo Application is opened (Figure 2a).

On the main menu page, the SiMo application will display interesting learning features, including two features at the top: Instructions for Use and Personal Data, then six features at the bottom: Basic Competencies and Indicators of Competency Achievement, Materials, Learning Videos, TGT, E-Evaluation, and Assignment. The features in the SiMo Application will later be used in the learning process from beginning to end (Figure 2b). The instruction page contains information about the function of the feature button on the SiMo Application to facilitate the use of media (Figure 3a). The developer profile page contains personal data information for learning media developers (Figure 3b). The Basic Competencies and Indicators of Competency Achievement pages contain information about learning that will take place based on Basic Competencies and Indicators of Competency Achievement for Animal Morphology Adaptation Materials in Class VI, Theme 2: Unity and Difference, Subtheme 2: Working Together in Diversity, Science Lesson Content, and Indonesian Language (Figure 4).
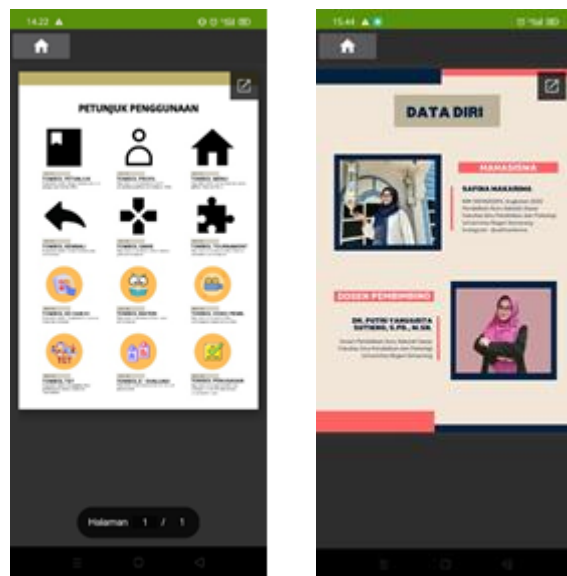


**Figure 3.** a. Instructions for Use, b. Developer Profile



**Figure 4.** Basic Competencies and Indicators of Competency Achievement
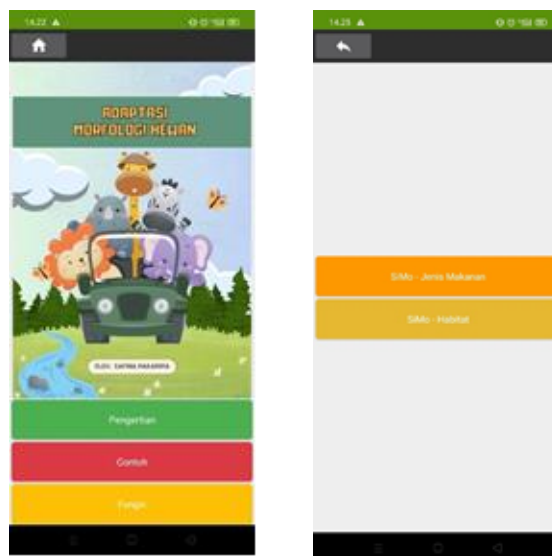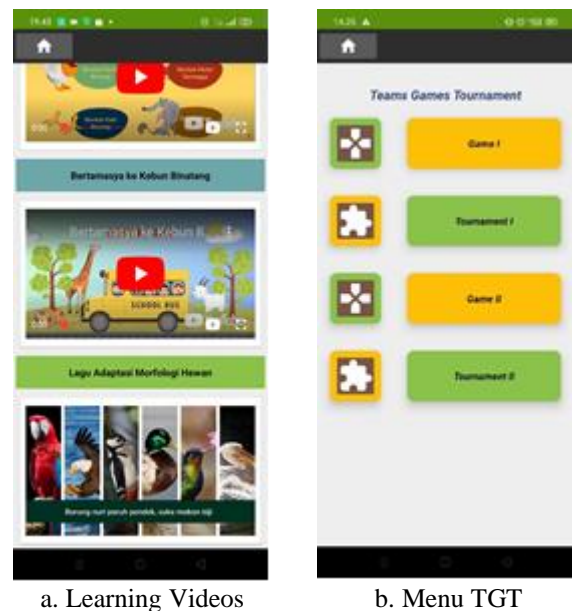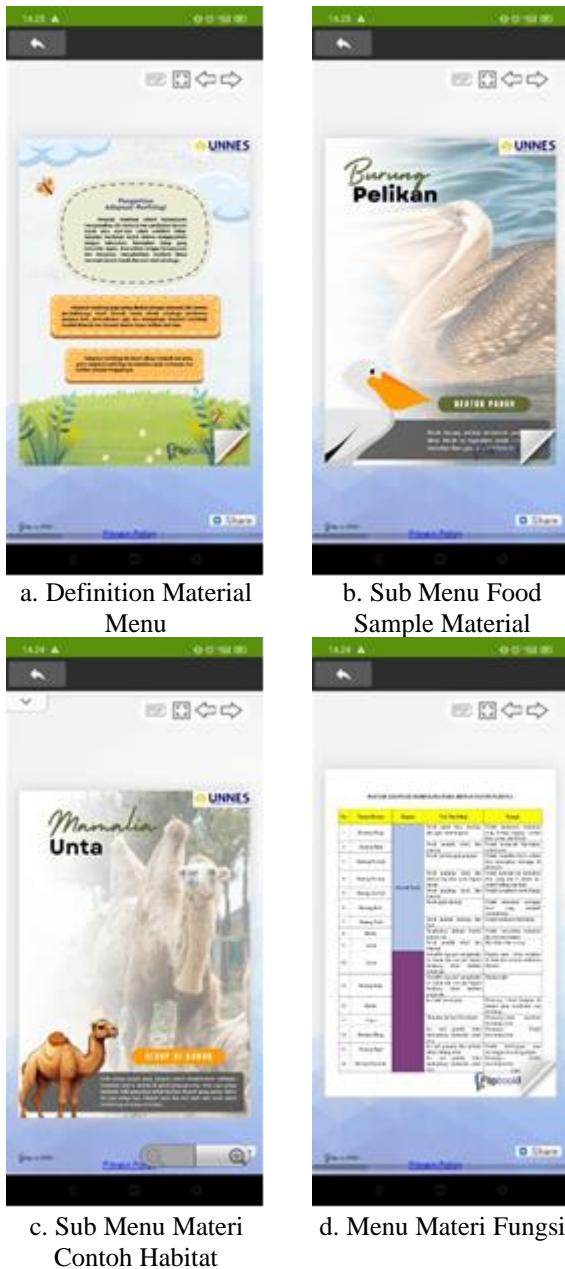


**Figure 5.** a. Material Menu, b. Sub Menu Sample Material

In Basic Competencies and Indicators of Competency Achievement, it is explained that the learning indicators emphasize the ability of students to determine and analyze the form of animal morphological adaptation, which in the SiMo Application displays many images of animals with various types of morphological adaptations. Students will also be asked to present works on morphological adaptation in animals through posters and mini vlogs.



a. Definition Material Menu



b. Sub Menu Food Sample Material



c. Sub Menu Materi Contoh Habitat



d. Menu Materi Fungsi

**Figure 6.** The material contains material about the meaning of animal morphological adaptation

The material menu page contains animal morphological adaptation materials, grouped into three options: Definition, Examples, and Functions presented attractively. So that students can easily understand the material of animal morphological adaptation (Figure 5a). Then, on the sub-menu page of the sample material, there are two options: examples of animal morphological adaptations based on the type of food and the type of habitat. In this feature, many different kinds of animals will be based on the type of morphological adaptation. It is hoped that it will make it easier for students to analyze the types of animal morphological adaptations (Figure 5b).

The menu page of the understanding material contains material about the meaning of animal morphological adaptation, which will explain the meaning of morphological adaptation in general and the division of animal morphological adaptation (Figure 6a). On the sub-menu page of the sample food type and habitat material, several images and information about animals based on their morphological adaptation characteristics will be displayed, making it easier for students to analyze the form of animal morphological adaptation (Figure 6b and c). The function material menu page contains information about the table of morphological adaptation characteristics and their functions (Figure 6d).



a. Learning Videos



b. Menu TGT



c. Animal Morphology Adaptation Song

**Figure 7.** The learning video

The learning video page consists of 4 video options starting from top to bottom, namely a video of introduction material to animal morphological adaptation, a division of types of animal morphological adaptations, a story video of an excursion to the zoo, and also an animal morphological adaptation song (Figure 7a and b).

The TGT menu page consists of 4 options: Game I and Tournament I are used for Learning I, then Game II and Tournament II are used for Learning II (Figure 7c). This menu uses a TGT (*Teams Games Tournament*) type cooperative learning model that can foster students' ability to adapt to friends with different backgrounds.



a. Menu TGT Game I



b. Menu TGT Tournament I



c. Menu TGT Game II



d. Menu TGT Tournament II
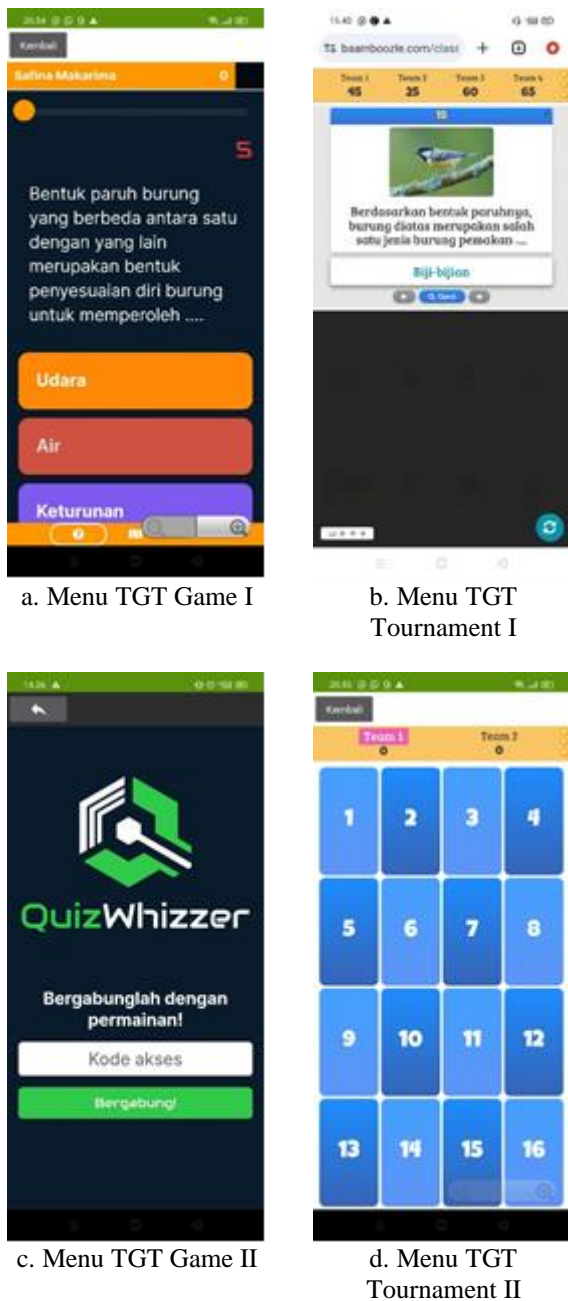
**Gambar 8.** The TGT menu page displays

The TGT menu page displays the TGT Game I and II menu pages integrated with QuizWhizzer, where students can later work on the questions displayed on each group's mobile phone. Then, students in the group can work together to answer questions and compete to get the most points from several groups (Figure 8a and c). The TGT

Tournament I and II menu pages are integrated with Bamboozle, where each group sends representatives of 2 students to answer the questions behind the cards to compete for the most points (Figure 8b and d).



a. E-Evaluation Menu
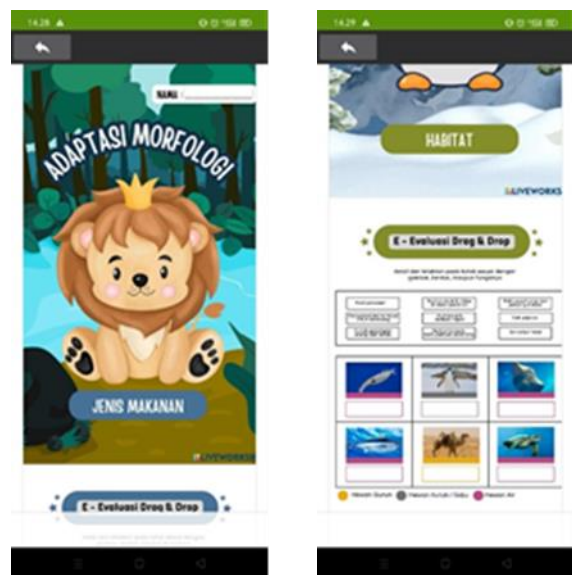


b. Food E-Evaluation Menu



c. E-E-Evalued Habitat

**Figure 9.** The E-Evaluation menu

The E-Evaluation menu page displays two types of assessments based on learning materials: the evaluation of animal morphological adaptations based on food types and habitat types (Figure 9a). As for the food e-evaluation menu page and the habitat e-evaluation menu page, the display is integrated with the web live worksheets, and students can work on evaluation questions drag-and-drop. This feature can be used to develop students' ability to analyze the form of animal morphological adaptation (Figure 9b and c).

The assignment menu page displays two assignments based on Learning I and Learning II: Task I as a poster-making task and Task II as a mini vlog-making task. Students' skills in implementing the understanding obtained in the learning process can be expressed through

the works produced in the assignment feature (Figure 10a, b, and c).



a. Assignment Menu



b. Menu Penugasan I

c. Menu Penugasan II

**Figure 10.** The assignment menu

### Design Validation

Products that have been developed are then tested by media and material experts to determine the level of product feasibility. The following are the results of the press and material validation recapitulation of the Song-Assisted SiMo Application with the TGT Model and its eligibility criteria.

**Table 6.** Validation of Media and Material Experts

|  | Media | Validation Material |
|---|---|---|
| Total Score | 73 | 75 |
| Maximum Score | 80 | 80 |
| Percentage | 91.25% | 93.75% |
| Criterion | Highly Worthy | Highly Worthy |

### Revisi Desain

Based on the results of validation tests conducted by media and material experts, the product was declared feasible without revision. Thus, the initial trial process can be continued with a small-scale trial on SD Negeri Yosorejo, Gringsing District, Batang Regency grade VI students.

### Initial Trial

After the media and material validation of the Song-Assisted SiMo Application product with the TGT Model and its worthiness for trial, the next stage is a trial of 50 multiple-choice questions to 9 grade VI students of SD Negeri Yosorejo. The students were selected based on criteria: three with the top rank, intermediate ranks, and three with the bottom rank. The results of the test questions were then analyzed to obtain 25 questions that could be used as pretest and posttest questions in small-scale and large-scale trials.

This product was then tested on a small group consisting of 15 students out of a total of 24 students in grade VI of SD Negeri Yosorejo, where the selected students did not participate in the test questions. This study uses a non-random purposive sampling technique to determine the number of samples, where sampling is carried out based on several factors following the desired criteria. In addition, the purposive sampling technique allows for more specific and in-depth results because the researcher can select the sample that is considered the most relevant and follows the research objectives.

The initial trial was carried out on students in small groups, starting with the work of 25 pretest questions to measure students' initial understanding of animal morphological adaptation materials before the learning product was implemented. The second stage involves implementing learning activities I and II using the Song-Assisted SiMo Application product with the TGT Model. After completing learning I and II, students return to work on 25 multiple-choice questions as a posttest. The posttest results are used to assess students' understanding of the subject after following the learning process with the Simo Application product.

The pretest and posttest data were then evaluated using the normality test formula, t-test, and n-gain to see if there was an improvement in student learning outcomes and effective products to use.

**Table 7.** Results of Pretest Normality Test – Posttest of SDN Yosorejo

|  | Shapiro-Wilk | | |
|---|---|---|---|
|  | Statistic | df | Sig. |
| Pretest | .875 | 15 | .041 |
| Posttest | .915 | 15 | .161 |

Table 7 displays the normality test results on the media of the Song-Assisted SiMo Application with the TGT Model. The pretest produced a Sig value of $< 0.05$, indicating that the data is not normally distributed. Meanwhile, the Sig value $> 0.05$ indicates normally distributed data in the post-test test. Therefore, the last data

analysis stage was the Wilcoxon and n-gain tests. Using a non-parametric statistical approach, the Wilcoxon test was used to compare the average values of the pretest and posttest. The results of the Wilcoxon test are shown in Table 8.

**Table 8.** Wilcoxon Pretest – Posttest Results SDN Yosorejo

|  | Posttest-Pretest |
|---|---|
| Z | -3.419[b] |
| Asymp. Sig. (2-tailed) | .001 |

The results of the Wilcoxon media test of the Song-Assisted SiMo Application with the TGT Model presented in Table 8 show that the significance value < 0.05. This shows that the alternative hypothesis (Ha) is accepted, and the null hypothesis (Ho) is rejected. Therefore, it can be concluded that there is a significant difference in students' learning outcomes before and after using the SiMo Application media. After the data is known to have substantial differences, the next step is to conduct an N-gain test to measure the level of effectiveness of the use of the media that has been developed. The results of the n-gain test are shown in Table 9.

**Table 9.** N-Gain Test Results of SDN Yosorejo

|  | N | Min. | Max. | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Ngain | 15 | .31 | .82 | .5912 | .13430 |
| Valid N (listwise) | 15 | | | | |

The results of the N-gain test on the SiMo Song-Assisted Application media with the TGT Model listed in Table 9 show an N-gain score of 0.5912 or 59%. This score is included in the moderate and quite effective category, meaning that using the Song-Assisted SiMo Application with the TGT Model can improve student learning outcomes.

**Product Revision**

The last step in this small group trial is to provide a response questionnaire to students and teachers to assess the product's practicality.

**Table 10.** Recapitulation of the Results of the Student and Teacher Response Questionnaire

|  | Student | Response Teacher |
|---|---|---|
| Total Score | 1224 | 53 |
| Maximum Score | 1344 | 60 |
| Percentage | 91% | 88% |
| Criterion | Excellent | Excellent |

From the results of the questionnaire recapitulation, the percentage of student response questionnaires reached 91% with very good criteria. This shows that the Song-Assisted SiMo Application with the TGT Model is easy to use, understand, and interest students in the learning process. In addition, the teacher response questionnaire showed a percentage of 88% with very good criteria without revision.

**Trial Use**

The initial step of testing the Song-Assisted SiMo Application product with the TGT Model in a small group at SDN Yosorejo showed quite good results. Furthermore, a large-scale trial involving 22 students of grade VI of SD Negeri Sidorejo 02 in Gringsing District. The sampling technique used in this large-scale use trial is saturated sampling, which consists of sampling the entire study population [26].

The stage of large-scale trials is still the same as small-scale trials. The first stage is to do 25 multiple-choice questions to determine students' initial understanding of animal morphological adaptation materials before using the product in learning. Learning activities I and II were carried out in the second stage with the Song-Assisted SiMo Application with the TGT Model. After completing learning I and II, students are given a posttest consisting of 25 multiple-choice questions. The post-test results determine the student's knowledge of the material after using the SiMo Application product in learning.

The pretest and posttest data were then analyzed using normality tests, t-tests, and n-gain to measure the improvement of student learning outcomes and product effectiveness.

**Table 11.** Pretest – Posttest Normality Test Results SDN Sidorejo 02

|  | Shapiro-Wilk | | |
|---|---|---|---|
|  | Statistic | df | Sig. |
| Pretest | .905 | 22 | .037 |
| Posttest | .926 | 22 | .102 |

Based on the results of the normality test on the SiMo Song-Assisted Application media with the TGT Model shown in Table 11, it is known that the Sig value < 0.05 in the pretest test, which indicates that the data is not normally distributed. Meanwhile, the Sig value > 0.05 in the post-test suggests that the data is usually distributed. Therefore, in the next stage, the Wilcoxon and N-gain tests are performed in the final data analysis. The Wilcoxon test used a non-parametric statistical approach to compare the average pretest and posttest scores. The results of the Wilcoxon test are shown in Table 12.

**Table 12.** Wilcoxon Pretest – Posttest Results SDN Sidorejo 02

|  | Posttest-Pretest |
|---|---|
| Z | -4.115[b] |
| Asymp. Sig. (2-tailed) | .000 |

The results of the Wilcoxon test on the SiMo Song-Assisted Application media with the TGT Model are shown in Table 12, where the significance value < 0.05 from the value. This indicates that the alternative hypothesis (Ha) is accepted and the null hypothesis (Ho) is rejected, which means there is a significant difference in students' learning outcomes before and after using the Song-Assisted SiMo Application media with the TGT Model. After the data is known to have substantial differences, the next step is to conduct an N-gain test to measure the level of effectiveness of the use of the media that has been developed. The results of the N-gain test are shown in Table 13.

**Table 13.** N-Gain Test Results SDN Sidorejo 02

|  | N | Min. | Max. | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Ngain | 22 | .35 | .89 | .6425 | .13679 |
| Valid N (listwise) | 22 |  |  |  |  |

The results of the N-gain test on the SiMo Song-Assisted Application media with the TGT Model listed in Table 13 show the results of the N-gain score test of 0.6425 with a percentage of 64%. This indicates that the N-gain score is in the moderate category and is quite effective, which means that using the SiMo Song-Assisted Application media with the TGT Model can improve students' learning outcomes.

The feasibility test results were obtained using very feasible and practical criteria in the research data analysis. The results of the N-Gain Test show moderate criteria. So it can be concluded, based on the above data analysis, that the use of SiMo Application media assisted by Songs with the TGT Model is very feasible and effective to be used as a learning medium for animal morphological adaptation in grade VI of elementary school. The SiMo Application learning media has several advantages, including the learning process involving competitions between teams in games and tournaments that can increase students' motivation to learn, songs used as learning media can also help strengthen students' memory because the information conveyed through songs will be easier to remember, and also learning with the TGT model can help students develop their social skills, both in cooperating, communicating, and solving problems collaboratively. Combining songs and the TGT model in the SiMo Application can create an interesting and effective learning environment that is fun and can improve student learning outcomes.

This research is relevant to the research conducted by [21] titled "The Effect of the Use of Interactive Media Based on Wordwall Quiz on Science Learning Outcomes in Elementary Schools". This study focuses on using Wordwall interactive media applications in science learning, with the results showing that the use of Wordwall interactive media is superior to conventional learning or no press. Also, using Wordwall makes learning more interesting and fun, so students are more active and motivated to learn.

A study entitled "The Influence of Singing Method on Remembering Ability in Science Subjects for Grade V Students of SD Negeri 46 Kota Pagar Alam" by [27], This study explores how song media can be used to improve the understanding of science concepts in grade IV elementary school students. The results of the study show that the use of singing methods has a significant influence on improving the ability to remember science subject matter. This can be seen from the results of the R2 determination test. From the results of the determination coefficient test, it was known that the R square value was 0.912, which means that the influence of the singing method variable on the student's remembering ability variable was 91.2%.

In addition, another study was conducted with the title "Improving the Character of Gotong Royong Using the Teams Games Tournament Learning Model in Elementary Science and Social Science Learning" by [28]. This study examines the TGT learning model from the perspective of social cooperation ability development. The study results show that using the TGT model effectively improves students' social skills, including working together in groups and managing conflicts and learning outcomes in science learning.

## Conclusion

Based on the results of research and discussion, the learning media of the Song-Assisted SiMo Application with the TGT Model for grade VI of elementary school in the subject of Natural Sciences (IPA) Animal Morphology Adaptation material was declared feasible, practical, and effective to be used in science learning. This is based on: (1) the percentage of validation from media experts is 91.25% and from material experts is 93.75%, both of which meet the criteria of being very feasible; (2) the results of the questionnaire of students' responses to the SiMo Song-Assisted Application media with the TGT Model of 91% and teachers of 88% without revision; and (3) the results of the normality test, t-test, and N-gain of 0.64254 with the category of moderate improvement and a percentage of 64% which shows that the product developed is quite effective.

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